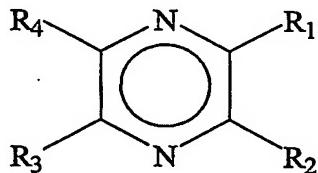


**Claims**

1. A composition that can suitably be used as an additive in beverages and foodstuffs, which composition:
- 5      i. contains at least 0.5%, preferably at least 1.0%, by weight of dry matter, of pyrazine derivatives according to formula (I):



10      wherein R<sub>1</sub> – R<sub>4</sub> independently represent hydrogen; a hydroxyhydrocarbyl residue; an ester of a hydroxyhydrocarbyl residue; or an ether of a hydroxyhydrocarbyl residue; and at least one of R<sub>1</sub> – R<sub>4</sub> is a hydroxyhydrocarbyl residue or an ester or an ether thereof; and

ii. exhibits an absorption ratio A<sub>280/560</sub> of at least 80, preferably of at least 250.

15      2. Composition according to claim 1, wherein the hydroxyhydrocarbyl residue comprises 1-10 carbon atoms.

3. Composition according to claim 1 or 2, wherein the hydroxyhydrocarbyl residue comprises at least two hydroxyl groups.

20      4. Composition according to any one of the preceding claims, wherein the pyrazine derivative contains at least two hydroxyhydrocarbyl residues.

25      5. Composition according to any one of the preceding claims, wherein the composition contains at least 0.1%, preferably at least 0.3%, of a fructosazine selected from the group consisting of 2,5-deoxyfructosazine, 2,6-deoxyfructosazine, 2,5-fructosazine, 2,6-fructosazine and combinations thereof, by weight of dry matter.

6. Composition according to any one of the preceding claims, wherein the composition exhibits an  $A_{280}$  that exceeds 0.01, preferably exceeds 0.05.

7. Composition according to any one of the preceding claims, wherein the  
5 composition is essentially completely water soluble.

8. Composition according to any one of the preceding claims, wherein the composition contains less than 30%, by weight of dry matter, of components having a molecular weight in excess of 30 kDa, particularly in excess of 5 kDa.

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9. Composition according to any one of the preceding claims, wherein the colour intensity of the composition at 610 nm does not exceed 0.024, preferably does not exceed 0.01.

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10. Composition according to any one of the preceding claims, wherein the solids content of the composition is at least 10 wt.%, preferably at least 20 wt.%, most preferably at least 30 wt.%.

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11. Composition according to any one of the preceding claims, wherein the total nitrogen content of the composition, as determined by Nitrogen Determination (Kjeldahl Method), Method II (FNP 5), is less than 20%, by weight of dry matter, preferably is within the range of 0.1 to 15% by weight of dry matter.

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12. A method of manufacturing a beverage or a foodstuff that is resistant to light induced flavour changes, said method comprising introducing into said beverage or foodstuff a light stabilising composition containing at least 0.5% by weight, preferably at least 1.0%, by weight of dry matter, of pyrazine derivatives as defined in any one of claims 1-5 and wherein the light stabilising composition, if it contains caramelised material, exhibits an absorption ratio  $A_{280/560}$  of at least 80, preferably of at least 250.

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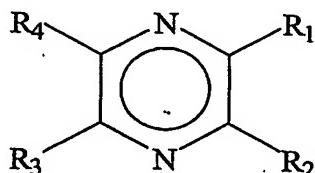
13. A method of manufacturing a hop containing beverage that is resistant to light induced flavour changes, said method comprising introducing into said hop containing beverage a light stabilising composition containing at least 0.5% by weight, preferably

at least 1.0%, by weight of dry matter, of N-heterocyclic substances and wherein the light stabilising composition, if it contains caramelised material, exhibits an absorption ratio  $A_{280/560}$  of at least 80, preferably of at least 250.

5 14. Method according to claim 13, wherein the ring(s) of the N-heterocyclic substances contain at least two nitrogen atoms.

10 15. Method according to claim 14, wherein the N-heterocyclic substances are selected from the group consisting of pyrazines, pyrimidines, pyridazines, and combinations thereof.

16. Method according to claim 15, wherein the N-heterocyclic substances are pyrazine derivatives according to formula (I):



15 wherein R<sub>1</sub> – R<sub>4</sub> independently represent hydrogen; a hydroxyhydrocarbyl residue; an ester of a hydroxyhydrocarbyl residue; or an ether of a hydroxyhydrocarbyl residue; and at least one of R<sub>1</sub> – R<sub>4</sub> is a hydroxyhydrocarbyl residue or an ester or an ether thereof.

20 17. Method according to claim 16, wherein the hydroxyhydrocarbyl residue comprises 1-10 carbon atoms.

18. Method according to claim 16 or 17, wherein the hydroxyhydrocarbyl residue comprises at least two hydroxyl groups.

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19. Method according to any one of claims 16-18, wherein the pyrazine derivative contains at least two hydroxyhydrocarbyl residues.

20. Method according to claim 16-19, wherein the composition contains at least 0.1%, preferably at least 0.3%, of a fructosazine selected from the group consisting of 2,5-deoxyfructosazine, 2,6-deoxyfructosazine, 2,5-fructosazine, 2,6-fructosazine and combinations thereof, by weight of dry matter.  
5
21. Method according to claim 12-20, wherein the light stabilising composition exhibits an  $A_{280}$  that exceeds 0.01, preferably exceeds 0.05.
- 10 22. Method according to any one of claims 12-21, wherein the composition exhibits an absorption ratio  $A_{280/560}$  of at least 80, preferably of at least 250.
- 15 23. Method according to any one of claims 12-22, wherein the composition is introduced into the beverage or foodstuff in an amount of between 0.01 and 1 wt.%, preferably of between 0.02 and 0.3 wt.%, calculated on the basis of the amount of dry matter introduced.
- 20 24. Method according to any one of claims 12-23, wherein the composition is introduced into a bottled beverage, preferably into a beverage bottled in green, clear or blue glass.
- 25 25. Method according to any one of claims 12-24 to prevent or reduce light induced flavour changes in beer, more preferably in beer exhibiting an EBC colour value of less than 25, preferably of less than 15.
- 30 26. Use of a composition containing at least 0.5% by weight, preferably at least 1.0%, by weight of dry matter, of N-heterocyclic substances as an additive in beverages or foodstuffs to prevent or reduce light induced flavour changes in said beverages or foodstuffs, wherein said composition, if it contains caramelised material, exhibits an absorption ratio  $A_{280/560}$  of at least 80, preferably of at least 250.
27. Use according to claim 26, wherein the ring(s) of the N-heterocyclic substances contain at least two nitrogen atoms.

28. Use according to claim 27, wherein the N-heterocyclic substances are selected from the group consisting of pyrazines, pyrimidines, pyridazines, and combinations thereof.

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29. Use according to claim 28, wherein the N-heterocyclic substances are pyrazine derivatives as defined in claim 1.

30. Use according to claim 29, wherein the hydroxyhydrocarbyl residue comprises  
10 1-10 carbon atoms.

31. Use according to claim 29 or 30, wherein the hydroxyhydrocarbyl residue comprises at least two hydroxyl groups.

15 32. Use according to any one of claims 29-31, wherein the pyrazine derivative contains at least two hydroxyhydrocarbyl residues.

20 33. Use according to any one of claims 29-32, wherein the composition contains at least 0.1%, preferably at least 0.3%, of a fructosazine selected from the group consisting of 2,5-deoxyfructosazine, 2,6-deoxyfructosazine, 2,5-fructosazine, 2,6-fructosazine and combinations thereof, by weight of dry matter.

34. Use according to any one of claims 26-33, wherein the light stabilising composition exhibits an  $A_{280}$  that exceeds 0.01, preferably exceeds 0.05.

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35. Use according to any one of claims 26-34, wherein the composition exhibits an absorption ratio  $A_{280/560}$  of at least 80, preferably of at least 250.

30 36. Use according to any one of claims 26-35, wherein the composition is introduced into the beverage or foodstuff in an amount of between 0.01 and 1 wt.%, preferably of between 0.02 and 0.3 wt.%, calculated on the basis of the amount of dry matter introduced.

37. Use according to any one of claims 26-36, wherein the composition is introduced into a bottled beverage, preferably into a beverage bottled in green, clear or blue glass.
- 5       38. Use according to any one of claims 26-37 to prevent or reduce light induced flavour changes in beer, more preferably in beer exhibiting an EBC colour value of less than 25, preferably of less than 15.
- 10      39. A process for the manufacture of a composition that may suitably be used as an additive to improve the stability of beverages or foodstuffs against light induced flavour changes, said process comprising the steps of:
- providing a caramelised feedstock;
  - decolourising said feedstock so as to increase its  $A_{280/560}$  by at least 100%.
- 15      40. Process according to claim 39, wherein the caramelised feedstock is subjected to a filtration step.
- 20      41. Process according to claim 39 or 40, wherein the caramelised feedstock contains at least 50% by weight of dry matter of brewing adjuncts, including at least 5% caramel by weight of dry matter.
42. Process according to claim 41, wherein the caramelised feedstock contains at least 10%, preferably at least 30% caramel by weight of dry matter.
- 25      43. Process according to claim 42, wherein the caramel is ammonia caramel, sulphite ammonia caramel or a combination thereof.
44. Process according to any one of claims 39-43, wherein the colour intensity of the caramelised feedstock at 610 nm exceeds 0.01, preferably exceeds 0.024.
- 30      45. Process according to any one of claims 39-44, wherein the colour intensity of the caramelised feedstock is reduced by at least a factor 10 as a result of the decolouration.

46. Process according to any one of claims 39-45, wherein the yield of the process is in the range of 5-90%, preferably in the range of 10-80%.
47. A beverage or foodstuff that is resistant to light induced flavour changes, wherein  
5 the beverage or foodstuff is obtained by a method according to any one of claims 12-25.
48. A hop containing beverage that is resistant to light induced flavour changes, said beverage containing pyrazine derivatives as defined in claim 1 and exhibiting an EBC colour value of less than 25, preferably of less than 15, wherein the content of the  
10 pyrazine derivatives, expressed in mg/kg, exceeds 5 x EBC colour value.
49. Beverage according to claim 48, wherein the hydroxyhydrocarbyl residue comprises 1-10 carbon atoms.  
15
50. Beverage according to claim 48 or 49, wherein the hydroxyhydrocarbyl residue comprises at least two hydroxyl groups.
51. Beverage according to any one of claims 48-50, wherein the pyrazine derivative  
20 contains at least two hydroxyhydrocarbyl residues.
52. Beverage according to any one of claims 48-51, wherein the beverage contains at least 0.5 mg/kg, preferably at least 1 mg/kg of a fructosazine selected from the group consisting of 2,5-deoxyfructosazine, 2,6-deoxyfructosazine, 2,5-fructosazine, 2,6-fructosazine and combinations thereof.  
25
53. Beverage according to any one of claims 48-52, wherein the beverage contains at least 0.5 mg/kg, preferably at least 1 mg/kg of the pyrazine derivatives.
- 30 54. Beverage according to any one of claims 48-53, wherein said beverage is bottled in green, clear or blue glass.